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NOTEWORTHY RECORDS OF BATS FROM NICARAGUA, WITH A CHECKLIST OF THE CHIROPTERAN FAUNA OF THE COUNTRY

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Nicaragua occupies a strategic position in Central America with respect to mammalian distributional patterns, but relatively little has been published concerning the fauna of the country and its zoogeographic relationships. The present paper records information on distribution, variation, and natural history of 40 species of bats from Nicaragua, 14 of which are here recorded for the first time from the country. Appended is a checklist of the chiropteran fauna of Nicaragua in which only primary literature with actual reference to specimens from the republic is cited.

The specimens upon which this report is based are, with few exceptions, in the collections of the Museum of Natural History of The University of Kansas. Some of our material was obtained in 1956 by J. R. and A. A. Alcorn, field representatives of the Museum and sponsored by the Kansas University Endowment Association; most of the specimens, however, were obtained by field parties of which we were members that worked in Nicaragua in 1964, 1966, 1967, and 1968 under the aegis of a contract (DA-49-193-MD-2215)

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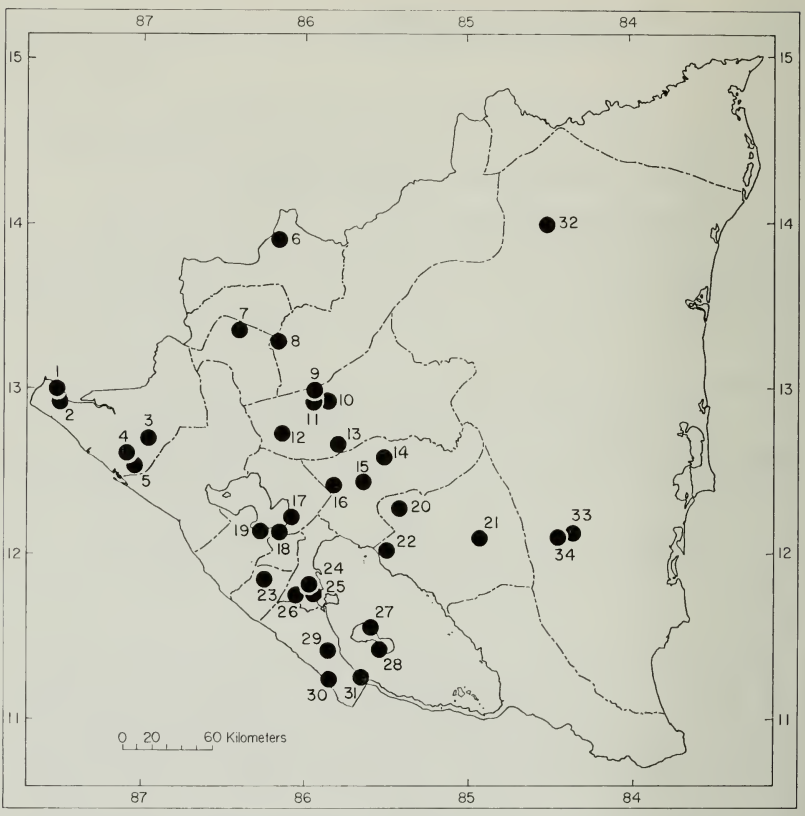

FIG. 1.—Map of Nicaragua showing location of place-names associated with specimens reported in this paper. Localities, identified by number, are as follows: 1, Potosí; 2, Cosigüina; 3, Hda. Bellavista, Volcán Casita; 4, Chinandega; 5, San Antonio; 6, Jalapa; 7, Condega; 8, Yalí; 9, Santa María de Ostuma; 10, San Ramón; 11, Matagalpa; 12, Darío; 13, Esquipulas; 14, Santa Rosa; 15, Boaco; 16, Teustepe; 17, Tipitapa; 18, Sabana Grande; 19, Managua; 20, Cuapa; 21, Villa Somoza; 22, Hato Grande; 23, Diriamba; 24, Guanacaste; 25, Mecatepe; 26, Nandaime; 27, Alta Gracia, Isla de Ometepe; 28, Mérida, Isla de Ometepe; 29, Rivas; 30, San Juan del Sur; 31, Sapoá; 32, Bonanza; 33, El Recreo; 34, Cara de Mono.

between the U.S. Army Medical Research and Development Command and The University of Kansas. Place-names associated with localities mentioned in the text from which specimens at Kansas were collected are plotted on Fig. 1.

In the accounts that follow, departments in Nicaragua are listed alphabetically, but localities within each department are arranged from north to south; elevations are given in meters or feet, depending on which was used on specimen labels. All specimens are in

the Museum of Natural History of The University of Kansas unless noted otherwise. We are indebted to Drs. Charles O. Handley, Jr., and Ronald Pine of the U.S. National Museum (USNM) for lending us certain critical specimens.

ACCOUNTS OF SPECIES

Saccopteryx leptura (Schreber, 1774)

Two specimens from El Paraíso, 1 km N Cosigüina, 20 m, Chinandega, on the Cosigüina Peninsula, provide the fourth locality of record for this white-lined bat in Nicaragua. Jones (1964a:506) and Davis *et al.* (1964:375) earlier reported a total of eight specimens from the departments of Managua and Zelaya. The species is known as far north in Middle America as Chiapas (Carter *et al.*, 1966:489).

Our two bats, both females, were shot on the evening of 1 March 1968 as they foraged around a yard light. One carried an embryo that measured 8 mm (crown-rump), whereas the other was reproductively inactive.

Peropteryx macrotis macrotis (Wagner, 1843)

Four females (one young and three adult) captured 5 km N and 9 km E Condega, 800 m, in Madriz, on 23 June 1964, provide the first record of this small sac-winged species from Nicaragua. The bats were shot from daytime roosts in small, well-lighted, cave-like spaces formed among immense blocks of granite in a small patch of tropical deciduous forest surrounded by extensive pine-oak woodland. None of the adult females was reproductively active. *Glossophaga soricina, Diphylla ecaudata,* and a large nursery colony of *Desmodus rotundus* were found in association with the *Peropteryx.* Measurements of our specimens agree closely with those reported for material from El Salvador (Felten, 1955:284) and Costa Rica (Starrett and Casebeer, 1968:3-4).

Noctilio labialis labialis (Kerr, 1792)

Specimens.—Boaco: 4 km W Teustepe, 140 m, 9. *Chontales:* Hato Grande, 13 km S, 8 km W Juigalpa, 60 m, 49. *Rivas:* 4 km S, 1.5 km E Alta Gracia, 40 m, Isla de Ometepe, 1; Finca Amayo, 13 km S, 14 km E Rivas, 40 m, 4. *Zelaya:* S side Río Mico, El Recreo, 25 m, 1; Cara de Mono, 50 m, 2.

This species has been reported previously from Nicaragua by several authors. All our specimens were netted over small streams or shot as they foraged; parts of scarabids and lepidopterans were found in the mouths of several individuals shot at Finca Amayo. Twenty-six of 31 autopsied females taken in April were pregnant,

each containing a single embryo—average crown-rump length 16.7 (5-26) mm. Testes of 15 males collected in April had an average length of 4.6 (2-7) mm, those of four taken in June, 5.2 (4-6) mm.

We follow Cabrera (1958:55), Husson (1962:63), and Handley (1966b:758) in use of the subspecific name *labialis,* the type locality of which is the "Mosquito shore" of Nicaragua, rather than Perú as suggested by Hershkovitz (1949:433-434).

Noctilio leporinus mexicanus Goldman, 1915

Specimens.—Chinandega: Potosí, 5 m, 2. *Chontales:* Hato Grande, 13 km S, 8 km W Juigalpa, 60 m, 4. *Rivas:* 4 km S, 1.5 km E Alta Gracia, 40 m, Isla de Ometepe, 4; Mérida, 40 m, Isla de Ometepe, 2; Finca Amayo, 13 km S, 14 km E Rivas, 40 m, 1.

This fish-eating species, first reported from Nicaragua by Davis *et al.* (1964:376), apparently occurs throughout Middle America, although known from the region by comparatively few records. We have 13 additional Nicaraguan specimens as listed above.

The two individuals (both females, one pregnant with an embryo that measured 20 mm) from Potosí were caught on 6 March in a mist net set over a large pool in a shallow estuarine stream; the mouth of the stream opened into the Gulf of Fonseca approximately 200 yards below our netting site. Other individuals of this species were observed as they foraged over large pools formed at high tide near the mouth of the stream. Our other specimens were caught in mist nets set over fresh water streams near Lake Nicaragua or along the shores of the lake. A female from near Alta Gracia, caught on 27 March, carried a single embryo that measured 41 mm, whereas one from Finca Amayo was lactating on 25 June. Four males taken on Isla de Ometepe in late March and early April had a mean testicular length of 9.5 (8-10) mm.

Pteronotus davyi fulvus (Thomas, 1892)

Specimens.—Chontales: Cuapa, 4. *Matagalpa:* 3 mi E San Ramón, 126.

This small naked-backed bat has not been reported previously from Nicaragua. Autopsy of seven females collected on 9 May near San Ramón revealed that four were pregnant, each with a single embryo—average crown-rump length 25.0 (21-29) mm.

The distribution of *P. davyi* is poorly known in much of Central America. The species was reported only recently from Costa Rica (Starrett and Casebeer, 1968:8) and is unknown from Panamá. We assign our specimens tentatively to the subspecies *fulvus* on geographic grounds.

Pteronotus parnellii fuscus (J. A. Allen, 1911)

Specimens.—Boaco: Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 1; Los Cocos, 14 km S Boaco, 220 m, 1. *Chinandega:* 6.5 km N, 1 km E Cosigüina, 10 m, 1. *Zelaya:* Bonanza, 850 ft, 1; 2 mi SW Bonanza, 600 ft, 1; S side Río Mico, El Recreo, 25 m, 1; Cara de Mono, 50 m, 4.

Although this species is widespread in Middle America, it has been known previously from Nicaragua only by a specimen from "Chontales" (Miller, 1902:402). All of our specimens were captured in mist nets. Two adult females (one taken on 28 February and the other on 8 March) each carried a single embryo (13 and 18 mm in crown-rump length, respectively); a female taken in April was lactating and had a flaccid uterus suggesting relatively recent parturition. Adult females captured in the months of June, July, and August evidenced no sign of reproductive activity. Two of these were in dark, fresh pelage, but one captured on 24 June and another on 28 July were molting. In both individuals, active molt evidently had slowed or subsided and remnants of the old pelage (rich ochraceous orange) were confined to a narrow strip at the lateral edges of the body.

We tentatively apply the subspecies name *fuscus* to our Nicaraguan bats on geographic grounds; one of us (Smith) currently is investigating geographic variation in the genus *Pteronotus.*

Pteronotus suapurensis (J. A. Allen, 1904)

Specimens.—Chontales: Cuapa, 1. *Matagalpa:* 3 mi E San Ramón, 24. *Zelaya:* Cara de Mono, 25 m, 4.

This relatively poorly known monotypic species occurs from southern Veracruz to the Amazon Basin. It has been reported from several localities in Central America including one in Nicaragua (Goodwin, 1942a:88). Three pregnant females from near San Ramón (9 May) carried embryos that had crown-rump lengths of 27, 27, and 28 mm, and two netted on 24 April at Cara de Mono each had an embryo that measured 22 mm. All of our specimens are in bright pelage that is fulvous red in color.

Micronycteris megalotis mexicana Miller, 1898

Specimens.—Carazo: 3 km N, 4 km W Diriamba, 600 m, 5. *Granada:* Hda. Mecatepe [2 km N, 11.5 km E Nandaime], 5. *Managua:* 5 mi NW Managua, 1. *Matagalpa:* Río Viejo, 7 mi WNW Darío, 4; 11 mi SE Darío, 1. *Zelaya:* S end Isla del Maíz Grande, 9.

The individuals from Isla de Maíz Grande were shot on 30 June as they flew from small caves and crevices in rocky outcrops on the south end of the island. Of the three adult females obtained at

TABLE 1.—Selected measurements of adults of two subspecies of *Micronycteris megalotis* from Nicaragua. Superscript numbers indicate fewer specimens averaged than indicated in left-hand column.

Number of specimens averaged or catalogue number, and sex	Length of forearm	Greatest length of skull	Zygomatic breadth	Breadth of braincase	Length of maxillary toothrow
Micronycteris megalotis mexicana, west-central Nicaragua[a]					
Average 8 (3♂, 5♀)	35.4	19.5[6]	9.5	8.0[7]	7.5
Minimum	33.0	18.8	9.1	7.7	7.3
Maximum	38.1	20.3	9.8	8.2	7.7
Isla del Maíz Grande, Nicaragua					
Average 6 (3♂, 3♀)	35.6	19.4	9.2	7.8	7.4
Minimum	34.5	19.1	9.0	7.7	7.3
Maximum	37.0	19.8	9.3	7.9	7.5
Micronycteris megalotis microtis, Greytown, Nicaragua (holotype)					
USNM 16366/23364, ♂	31.5	18.2	8.8	7.6	6.9
Río Coco, Nicaragua (AMNH)					
Average 6 (3♂, 3♀)	33.6	18.9[3]	—	7.5[3]	7.1[3]
Minimum	32.7	18.8	—	7.4	7.0
Maximum	34.2	19.0	—	7.6	7.2
Bonanza, Nicaragua					
KU 96251, ♂	32.3	18.4	8.8	7.6	7.0

[a] Specimens labeled with reference to Darío, Diriamba, and Managua.

that time, two were lactating; each was accompanied by a young, the forearms of which measured 19.7 (male) and 21.3 mm (female). Two adult males from Isla del Maíz Grande had testes 2 mm in length.

Four of the five specimens taken northwest of Diriamba were shot from a daytime retreat in a culvert; the fifth was caught by hand as it attempted to fly out of a hollow, fallen tree. Two adult females captured on 31 March were pregnant, each carrying a single embryo (13 and 14 mm in crown-rump length), whereas two obtained on 14 August showed no sign of reproductive activity. An adult male, also taken on 14 August, had testes 2 mm in length. Of three additional adult females, one captured on 3 June was pregnant (embryo 21 mm in crown-rump length), whereas two obtained on 14 April evinced no gross reproductive activity.

The subspecies *mexicana* has not been reported previously from Nicaragua, although Gardner *et al.* (1970:715) recently extended its known distribution southward from Honduras (Goodwin, 1942c: 124) and El Salvador (Felten, 1956:180) to west-central Costa Rica. In Nicaragua, as apparently in Costa Rica, *mexicana* occupies

the Pacific versant, the Caribbean lowlands being inhabited by the smaller race, *Micronycteris megalotis microtis* Miller, 1898 (type locality, Greytown, Nicaragua—reported also from "Río Coco," Nicaragua, by J. A. Allen, 1910:110). Nicaraguan examples of *M. m. mexicana* are, on the average, considerably larger in cranial dimensions and length of forearm than are specimens of *M. m. microtis* (see Table 1). The series of *microtis* from "Río Coco," probably from the headwaters of that stream in the vicinity of San Juan de Río Coco and thus near the divide between Caribbean and Pacific drainages, is intermediate in size between the two subspecies and suggests intergradation between them. As noted also by Gardner *et al.* (1970:715), we find no differences in length of ear between *microtis* and *mexicana* (contrary to Miller's claim, in the original description, that *microtis* had noticeably smaller ears), nor do we note any consistent differences in color between the two races on the basis of the specimens at hand.

Our specimens from Isla del Maíz Grande inexplicably agree rather closely in size (average but slightly smaller) with specimens of *M. m. mexicana* from western Nicaragua and elsewhere within the range of the subspecies, and are tentatively, therefore, referred to *mexicana*. Four specimens earlier reported (G. M. Allen, 1929: 130) from the same island also are relatively large (forearm 35 mm). Further commentary on this insular population must await a time when additional material is available from Central America.

Tonatia nicaraguae Goodwin, 1942

Specimens.—Boaco: Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 1. *Chontales:* Hato Grande, 13 km S, 8 km W Juigalpa, 60 m, 1.

Only four specimens of this seemingly rare species have been recorded previously from Nicaragua—one (the holotype) from Kanawa Creek, near Cukra, north of Bluefields, 100 ft, Zelaya (Goodwin, 1942b:205), another from 12.5 mi. S and 13 mi. E Rivas, 125 ft, Rivas (Davis and Carter, 1962:67-68), and two from 6 km N Tuma, 500 m, Matagalpa (Valdez and LaVal, 1971:248). Our specimens were caught in mist nets placed over small, quiet streams that were fringed with tall, gallery forest. The surrounding areas were savanna-like with small stands of secondary forest. An adult male taken on 21 April had testes that measured 5 mm in length, whereas those of another (9 August) were 3 mm.

Handley (1966b:761) synonymized *T. nicaraguae* with *Tonatia minuta* Goodwin, 1942, a conclusion with which we agree. However, the name *nicaraguae* (Goodwin, 1942b:205) has page priority over *minuta* Goodwin (*op. cit.*:206) and is the valid name for the

species rather than *minuta* as used by Handley (see also LaVal, 1969:820; Gardner *et al.*, 1970:716; Valdez and LaVal, 1971:248).

Measurements of the two males (that from Hato Grande listed first) are as follows: total length, 63, 60 mm; length of tail, 5, 6 mm; length of hind foot, 10, 9 mm; length of ear, 23, 23 mm; length of forearm, 34.5, 35.6 mm; weight, 11.4, 8.8 gms; greatest length of skull, 20.2, 20.5 mm; zygomatic breadth, 9.5, 9.5 mm; breadth of braincase, 8.5, 8.2 mm; postorbital breadth, 3.1, 2.9 mm; length of maxillary toothrow, 7.0, 7.1 mm; breadth across upper molars, 6.3, 6.5 mm. We have not compared our specimens directly with others from Middle America. On the basis of available measurements, they resemble material reported from Honduras (LaVal, 1969:820), averaging larger than other specimens for which measurements have been published (see especially Goodwin, 1942b:206; Davis and Carter, 1962:68; Davis *et al.*, 1964:379; Gardner *et al.*, 1970: 716-717).

Phyllostomus hastatus panamensis J. A. Allen, 1904

Specimens.—Carazo: 3 km N, 4 km W Diriamba, 600 m, 1. *Madriz:* Darailí, 5 km N, 14 km E Condega, 940 m, 4. *Managua:* 3 km SW Tipitapa, 40 m, 1; 3 km N Sabana Grande, 50 m, 2; 2 km N Sabana Grande, 40 m, 1; 5 mi S Managua, 2. *Matagalpa:* La Danta, 1 km N, 5 km E Esquipulas, 760 m, 1. *Nueva Segovia:* 4.5 km N, 2 km E Jalapa, 630 m, 2; 1.5 km N, 1 km E Jalapa, 660 m, 1. *Zelaya:* Bonanza, 850 ft, 2; El Recreo, 25 m, 8.

This large spear-nosed species has been reported previously from Nicaragua only from Matagalpa (Goodwin, 1942c:126). *Phyllostomus hastatus* evidently occurs throughout the country and is relatively common in some places.

Two females taken 5 mi S Managua on 13 March each carried a single embryo (crown-rump length 27 and 32 mm). Lactating females were captured in June, July, and August.

Trachops cirrhosus coffini Goldman, 1925

A male fringe-lipped bat netted over a small stream at Cara de Mono, 50 m, Zelaya, in the Caribbean lowlands, on 24 April, 1968, constitutes the second known occurrence of this species in Nicaragua. Carter *et al.* (1966:491) earlier reported two males from Río Coco, 64 mi NNE Jinotega, 1000 ft, Jinotega. The testes of our specimen were 4 mm long.

Davis and Carter (1962:69), Carter *et al. (loc. cit.),* and Starrett and Casebeer (1968:11) did not apply a trinomen to bats of this species and noted overlap of measurements between *T. c. cirrhosus* (Spix) and *T. c. coffini* Goldman. However, until detailed com-

parisons can be made, we follow Jones (1966:452) in retaining the subspecific name *coffini*.

Chrotopterus auritus auritus (Peters, 1856)

An adult male captured in a mist net set in a forest clearing at Santa María de Ostuma, 1250 m, Matagalpa, represents the first record of this bat from Nicaragua. The testes of our individual, taken on 1 July 1966, were 6 mm in length. Externally and cranially our Nicaraguan example closely resembles specimens of *C. auritus* from Veracruz and the Yucatán Peninsula. Handley (1966b:762) and Starrett and Casebeer (1968:12) expressed doubt as to the validity of the currently used subspecific names in this species. Comparisons of cranial and external measurements of the material at hand with those given in various published accounts—Burt and Stirton (1961), Starrett and Casebeer (1968), and Thomas (1905), for example—reveal little variation. Until additional information is available (especially as concerns the South American races), however, we tentatively apply the subspecific name *C. a. auritus* to Middle American populations.

Anoura geoffroyi lasiopyga (Peters, 1868)

Four specimens of this species, netted on 24 and 25 July 1967 in a banana grove 1.5 km N and 1 km E Jalapa, 660 m, Nueva Segovia, provide the first record of this glossophagine from Nicaragua. Two males each had testes 6 mm in length; one female evidenced no reproduction activity, whereas another carried an embryo 4 mm in crown-rump length. In addition to our material, there is a specimen in the British Museum (BM 8.6.22.4) from Cafetal "Concordia," 4000 ft, Jinotega.

It may be noteworthy that the two localities at which this bat is known both are in the highlands of the northern part of Nicaragua, and that we failed to take additional specimens in many hundreds of hours of netting in other places in the country.

Choeroniscus godmani (Thomas, 1903)

Godman's bat was reported from Nicaragua by Handley (1966a: 86), who used the locality designation "El Realejo" for the three specimens available to him. Actually, the three are from the nearby Hda. San Isidro, 10 km S Chinandega. We have taken three additional specimens as follows: Santa Rosa, 17 km N and 15 km E Boaco, 300 m, Boaco (an adult female taken on 21 March, which was pregnant with an embryo measuring 16 mm in crown-rump length); 2 km E Yalí, 900 m, Jinotega (an adult male netted on 3

August, testes 4 mm in length); and Santa María de Ostuma, 1250 m, Matagalpa (a nonpregnant, adult female captured on 11 April). Bats of this species have been taken as far north as the western Mexican state of Sinaloa (Jones, 1964b:510).

Lichonycteris obscura Thomas, 1895

Managua is the type locality of this rare long-nosed species and a specimen was reported from 6 mi W Rama, 50 ft, Zelaya, by Davis *et al.* (1964:380). Our collection contains three males, one from Jalapa, 660 m, Nueva Segovia, captured on the night of 27 July 1967 as it flew around a lighted room in a house, and two from the south side of the Río Mico, El Recreo, 25 m, Zelaya, taken on 26 and 27 July 1966 (one was netted and the other caught by hand in the lighted room of a building at night).

Selected measurements of the three males are, respectively: total length, 55, 58, 57 mm; length of tail, 7, 10, 9 mm; length of hind foot, 7, 9, 9 mm; length of ear, 10, 11, 11 mm; length of forearm, 30.9, 31.0, 30.8 mm; weight, 6.8, 6.8, 6.2 gms; length of testes, 1, 2, 2 mm; greatest length of skull, 18.5, 18.0, 17.9 mm; breadth of braincase, 8.1, 8.4, 8.3 mm; length of maxillary toothrow, 5.7, 5.5, 5.7 mm.

Carollia castanea H. Allen, 1890

Specimens.—Boaco: Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 7. *Chontales:* 1 km N, 2.5 km W Villa Somoza, 330 m, 4. *Matagalpa:* 1 km NE Esquipulas, 420 m, 1. *Nueva Segovia:* 7 km N, 4 km E Jalapa, 660 m, 4. *Zelaya:* S side Río Mico, El Recreo, 25 m, 6; Cara de Mono, 50 m, 15.

Bats of this species apparently are common in the Caribbean lowlands of Nicaragua; the highest altitude at which we have taken specimens is 660 meters. The only previous report of *C. castanea* from Nicaragua evidently is that of Davis *et al.* (1964:379), who mentioned it in passing (from Cacao, Zelaya) in an account of *Macrophyllum macrophyllum.* Two adult females each carried an embryo having crown-rump lengths of 20 (21 March) and 10 mm (27 July). Adult females evincing no gross reproductive activity were taken in February (one), March (one), April (four), June (three), July (two), and August (two). Four adult males netted on 24 April had testes with an average length of 7.0 (5-9) mm, whereas those of four other adult males taken in late June had an average of 4.0 (2-6) mm.

In our collections from Nicaragua, we find at least three kinds of *Carollia* and we follow Handley (1966b:764-765) in tentatively assigning these to *C. castanea, C. subrufa,* and *C. perspicillata.* The

systematics of this genus is currently under study by Ronald H. Pine. In Nicaragua, *castanea* differs from *subrufa* (with which it has been confused in the past) in being smaller, both externally and cranially, and much darker in color as well as in the additional characters mentioned by Handley *(loc. cit.)*.

Sturnira ludovici ludovici Anthony, 1924

An adult male (testes 6 mm) yellow-shouldered bat from Darailí, 5 km N and 14 km E Condega, 940 m, in Madriz, provides the only specimen thus far reported from Nicaragua. *Sturnira ludovici* evidently is relatively rare in Nicaragua and may be confined to the highlands in the north, whereas the smaller *S. lilium* is abundant throughout the country and is the only other species of *Sturnira* represented in our collections.

We provisionally refer our specimen to *S. l. ludovici* pending Luis de la Torre's forthcoming review of the genus. Selected measurements are: total length, 77 mm; length of hind foot, 15 mm; length of ear, 19 mm; length of forearm, 44.8 mm; weight, 26.8 gms; greatest length of skull, 24.2 mm; zygomatic breadth, 14.2 mm; postorbital breadth, 6.3 mm; breadth of braincase, 10.5 mm; length of maxillary toothrow, 6.8 mm.

Uroderma magnirostrum Davis, 1968

In the original description of *U. magnirostrum,* Davis (1968: 680) reported one specimen from Nicaragua—a female in our collection from 3 km N and 4 km W Sapoá, 40 m, Rivas. We have two additional specimens, both from the relatively dry northwestern Departamento de Chinandega. On 8 July 1966, a male (testes 2 mm) was netted under trees along a small stream at San Antonio, 35 m, and a female (one embryo 28 mm in crown-rump length) was netted on 4 March 1968 over a warm spring at a place 4.5 km N Cosigüina, 15 m. Judging from published records, this species is limited in Middle America to the Pacific versant.

Selected measurements of the three Nicaraguan specimens are, respectively: total length, 65, 64, 67 mm; length of hind foot, 12, 11, 14 mm; length of ear, 16.5, 16, 18 mm; length of forearm, 42.2, 41.7, 45.2 mm; weight, 16.2, 13.8, 21.4 (pregnant) gms; greatest length of skull, 22.7, 23.4, 23.8 mm; zygomatic breadth, 12.4, 12.9, 13.1 mm; postorbital breadth, 5.8, 5.5, 5.9 mm; mastoid breadth, 10.9, 11.1, 11.1 mm; length of maxillary toothrow, 7.9, 8.1, 8.6 mm.

Vampyrops helleri Peters, 1866

Specimens.—Boaco: Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 3. *Carazo:* 3 km N, 4 km W Diriamba, 600 m, 2. *Chinandega:* Potosí, 5 m, 1;

6.5 km N, 1 km E Cosigüina, 10 m, 1; 4.5 km N Cosigüina, 15 m, 3; Hda. Bellavista, 720 m, Volcán Casita, 13. *Chontales:* 1 km N, 2.5 km W Villa Somoza, 330 m, 4. *Granada:* Finca Santa Cecilia, 6.5 km SE Guanacaste, 660 m, 4. *Matagalpa:* Finca Tepeyac, 10.5 km N, 9 km E Matagalpa, 960 m, 1. *Nueva Segovia:* 4.5 km N, 2 km E Jalapa, 680 m, 2; 1.5 km N, 1 km E Jalapa, 660 m, 2. *Rivas:* 2 km N, 3 km E Mérida, 200 m, Isla de Ometepe, 4; 4 km N, 4 km W Sapoá, 40 m, 1. *Zelaya:* S side Río Mico, El Recreo, 25 m, 3.

Only two specimens of this small white-lined species have been reported previously from Nicaragua—one from 1 km NW La Gatiada, 1300 ft, Chontales (Davis *et al.*, 1964:383), and the other from 3 mi NNW Diriamba, Carazo (Jones, 1964a:507). This bat was relatively rare in collections until the last decade or so. Handley (1966b:766) reported *V. helleri* as abundant in the lowland areas of Panamá, and we found the same to be true in Nicaragua. We suspect that future investigations in Middle America will reveal this species to be a common member of lowland tropical communities. It is known as far north as southern Veracruz (Carter *et al.*, 1966:494).

Most of our specimens were captured in mist nets set over small streams bordered by gallery forest, or in banana groves. The range of ecological conditions in which this species was taken is represented by the semiarid environment of the Cosigüina Peninsula in northwestern Nicaragua and the humid tropical forest (secondary growth) in the vicinity of El Recreo in the Caribbean lowlands. Pregnant females were captured in March, April, June, July, and August, indicating that this species probably breeds throughout much of the year.

Vampyrodes major G. M. Allen, 1908

Specimens.—Boaco: Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 8. *Chontales:* 1 km N, 2.5 km W Villa Somoza, 330 m, 2. *Zelaya:* S side Río Mico, 25 m, 6.

This large white-lined stenodermine was known previously from Nicaragua by a single specimen from an unknown locality (J. A. Allen, 1910:112). All of our specimens were caught in mist nets, which were set over streams at Santa Rosa and near Villa Somoza, and in a banana grove at El Recreo. Two pregnant females, captured on 11 and 13 July at Santa Rosa, each carried an embryo (4 and 27 mm in crown-rump length, respectively); one of two other adult females captured there on 9 August also had an embryo (35 mm in length) but the other evidently was reproductively quiescent. Testes of adult males varied in length from 3 to 10 mm on the following dates (testicular lengths in parentheses): 25 February

(10 mm); 21 March (8, 8 mm); 17 June (3, 4 mm); 13 July (6 mm); 27-28 July (4, 4 mm); 3 August (4 mm); 5 August (3 mm); 9 August (4 mm).

We follow Starrett and Casebeer (1968:12) in the use of the specific name *major,* rather than *caraccioli* as suggested by Cabrera (1958), Goodwin and Greenhall (1961), and Handley (1966b).

Vampyressa nymphaea Thomas, 1909

A pregnant female (crown-rump length of embryo 5 mm) was captured in a mist net set in a small banana grove on the south side of the Río Mico, El Recreo, 25 m, in the Caribbean lowlands, on 27 February 1968. This specimen provides the first record of the big yellow-eared bat from Nicaragua. The species was recently reported for the first time from Costa Rica (Gardner *et al.,* 1970: 721); it was characterized as uncommon in Panamá by Handley (1966b:767). The one Costa Rican locality of record also is in the Caribbean versant.

Selected external and cranial measurements of our female are: total length, 58 mm; length of hind foot, 11 mm; length of ear, 16 mm; length of forearm, 36.2 mm; weight, 12.3 gms; greatest length of skull, 21.1 mm; condylobasal length, 18.4 mm; zygomatic breadth, 12.3 mm; mastoid breadth, 10.5 mm; breadth across canines, 4.6 mm; breadth of braincase, 9.4 mm; length of maxillary toothrow, 7.2 mm; length of mandibular c-m3, 7.8 mm.

Vampyressa pusilla thyone Thomas, 1909

Specimens.—Boaco: Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 5. *Chontales:* 1 km N, 2.5 km W Villa Somoza, 330 m, 1. *Managua:* Hda. San José, 2. *Matagalpa:* 2 km N, 6 km E Esquipulas, 960 m, 2.

The only previous record of occurrence for the small yellow-eared bat from Nicaragua is based on an adult female from Hda. La Cumplida, 670 m, Matagalpa (Starrett and de la Torre, 1964:60).

Two individuals taken near Esquipulas in mid-March, a pregnant female (crown-rump length of embryo 16 mm) and a male (testes 4 mm), were captured in nets set across trails cut through secondary forest. The wind was quite strong in this area at the time of our visit and only a few other species of bats—*Glossophaga soricina, Artibeus jamaicensis, A. toltecus, A. phaeotis, Uroderma bilobatum, Sturnira lilium, Centurio senex,* and *Diphylla ecaudata* —were taken in the same nets. The specimens from Boaco and Chontales were captured over small streams bordered by gallery forest. Four females collected at Santa Rosa on 21 March were pregnant; each carried a single embryo that measured 5, 18, 21, and

30 mm in crown-rump length; a male taken on the same date had testes that measured 3 mm.

Selected external and cranial measurements of two males, followed by the average (extremes in parentheses) of six females are: length of forearm, 31.1, 30.8, 30.8 (30.0-31.4) mm; greatest length of skull, 18.9, 18.9, 18.5 (18.1-18.8) mm; zygomatic breadth, 11.0, 11.0, 10.6 (10.4-10.9) mm; mastoid breadth, 9.5, 9.2, 9.2 (9.0-9.3) mm; length of maxillary toothrow, 6.1, 5.9, 5.9 (5.7-6.1) mm.

Chiroderma villosum jesupi J. A. Allen, 1900

Specimens.—Chinandega: 6.5 km N, 1 km E Cosigüina, 10 m, 2; 4.5 km N Cosigüina, 15 m, 7; Hda. Bellavista, 720 m, Volcán Casita, 5; San Antonio, 35 m, 2. *Rivas:* 2 km N, 3 km E Mérida, 200 m, Isla de Ometepe, 1.

This species has been reported in Middle America from as far north as southern México. It evidently is uncommon in Costa Rica (see Gardner *et al.*, 1970:722) and Panamá (Handley, 1966b:767). Our material, all collected from mist nets and consisting of 16 specimens from the northwestern department of Chinandega and one from Isla de Ometepe in Lago de Nicaragua, constitutes the first report of this bat from Nicaragua.

Four of five females taken in early March were pregnant; embryos averaged 26.0 (25-29) mm in crown-rump length. Four females taken in July carried embryos 14, 20, 23, and 25 mm in length. Testes of five adult males captured in March and April had an average length of 4.4 (3-7) mm, whereas those of two taken in July were 3 mm in length.

Artibeus toltecus hesperus Davis, 1969

When Davis (1969) named *A. t. hesperus,* he assigned specimens only from as far south as El Salvador to the new subspecies, referring the three Nicaraguan examples of the species at his disposal to the nominal race. On the night of 6-7 April 1968, one of us (Smith) netted bats on the south part of Isla de Ometepe at a place 2 km N and 3 km E Mérida, 200 meters in elevation. One net was set across, and another parallel to, a small, boulder-strewn stream; the surrounding area was planted to coffee and had a good canopy of tall deciduous trees. Among the bats captured at this location were 10 *A. toltecus* that are referable to the subspecies *hesperus,* judging by their small size (Table 2).

Six of our specimens are females and each carried an embryo (range in crown-rump length 20-28 mm). Three adult males had testes 5, 6, and 7 mm in length. External measurements (extremes in parentheses) of our series are: total length, 55.9 (51-60) mm;

TABLE 2.—Selected measurements of two subspecies of *Artibeus toltecus* from Nicaragua.

Number of specimens averaged and sex	Length of forearm	Greatest length of skull	Zygomatic breadth	Mastoid breadth	Length of maxillary toothrow
Artibeus toltecus toltecus, Departamento de Matagalpa					
Average 6 (3♂, 3♀)	40.3	20.3	12.1	10.7	6.6
Minimum	38.8	19.8	11.8	10.5	6.5
Maximum	41.5	20.5	12.5	10.9	6.8
Artibeus toltecus hesperus, Isla de Ometepe, Rivas					
Average 10 (4♂, 6♀)	38.0	19.4	11.5	10.2	6.3
Minimum	37.0	18.8	11.2	9.8	6.1
Maximum	39.7	19.8	11.8	10.5	6.5

length of hind foot, 10.7 (10-12) mm; length of ear, 14.8 (14-16) mm; weight of four males, 9.9 (8.8-11.5) gms; weight of six pregnant females, 14.9 (12.7-16.9) gms.

Artibeus toltecus toltecus (Saussure, 1860)

Specimens.—Matagalpa: Santa María de Ostuma, 1250 m, 5; 2 km N, 6 km E Esquipulas, 960 m, 1.

This bat has been reported from Nicaragua previously by Andersen (1908:300) and Davis (1969:28), based on a total of four specimens. We netted this species at Santa María de Ostuma in patches of cloud forest at a cafetal. The specimen from near Esquipulas was taken in a net placed across a trail in second growth forest. Two females collected on 11 April and one taken on 30 June were pregnant (embryos 21, 26, and 12 mm, respectively, in crown-rump length). Testes of a male netted on 14 March were 7 mm in length, whereas those of two obtained on 11 April measured 4 and 7 mm. Selected measurements of our six specimens are given in Table 2.

Artibeus watsoni Thomas, 1901

Specimens.—Chontales: 1 km N, 1.5 km W Villa Somoza, 330 m, 3. *Nueva Segovia:* 7 km N, 4 km E Jalapa, 600 m, 1. *Zelaya:* Bonanza, 850 ft, 6; S side Río Mico, El Recreo, 25 m, 6; Cara de Mono, 50 m, 1.

Davis (1970a:393-394) recently reviewed the systematic status of this small fruit-eating bat and recorded specimens from southeastern Nicaragua; the species was first reported from the country by Andersen (1908:290), based on a specimen from the Escondido River. Our additional material reveals that *A. watsoni* occurs throughout eastern Nicaragua, the specimen from Nueva Segovia extending the known range as mapped by Davis *(loc. cit.)*.

A female from Bonanza (23 February) carried an embryo 14 mm in crown-rump length, whereas one from El Recreo (26 February) was not reproductively active; one of two females netted near Villa Somoza in early August was pregnant (embryo 21 mm in crown-rump length). Seven adult males collected in late February and early March had an average testicular length of 5.9 (5-7) mm; testes of two adults taken in late June and one captured in early August all measured 5 mm. The testes of young males (grayish pelage, partially unfused phalangeal epiphyses) were 2 or 3 mm in length.

Centurio senex senex Gray, 1842

Specimens.—Chinandega: 4.5 km N Cosigüina, 15 m, 1; San Antonio, 35 m, 5. *Matagalpa:* 2 km N, 6 km E Esquipulas, 960 m, 3. *Nueva Segovia:* 7 km N, 4 km E Jalapa, 660 m, 1. *Zelaya:* S side Río Mico, El Recreo, 25 m, 1.

Paradiso (1967) reviewed geographic variation in this unique bat, the type locality of which was restricted to Realejo, Chinandega, Nicaragua, by Goodwin (1946:327). Because additional material had not been reported from Nicaragua, Paradiso (*op. cit.*:598) felt it was "premature to restrict the type locality to a specific area in that country" (the holotype was obtained on the voyage of the H.M.S. Sulphur, which called at Realejo), and preferred the more general designation "west coast of Mexico or Central America." In view of the fact that we now have specimens from but a few miles distant from Realejo (at San Antonio), we see no reason to contest Goodwin's restriction of the type locality to that place.

Specimens from San Antonio were collected along a small stream, bordered by a bilevel gallery forest, in an area otherwise planted mostly to cane. Many trees of the lower level were covered by an extremely thick network of vines, which were interwoven with branches and supported fallen leaves and debris from the upper level. This situation led to formation of small "rooms" or "cubicles" under some shorter trees; the bats were shot as they hung from small branches under one such tree, which was in fruit. All of our other specimens were captured in mist nets.

Pregnant females were taken on the following dates (crown-rump length of embryo in parentheses): 25 February (12 mm), 2 March (17 mm), 15 March (14 mm); a nonpregnant female also was taken on 15 March. Five males captured at San Antonio on 9 and 10 March had an average testicular length of 5.6 (5-6) mm. A male taken in July had testes 4 mm in length, whereas those of one obtained on 14 March were 5 mm long.

Selected measurements (average, with extremes in parentheses) of 11 adults (seven males and four females) are as follows: length

of forearm, 42.5 (41.5-43.7) mm; condylobasal length (10 specimens only), 14.8 (14.5-15.0) mm; zygomatic breadth, 14.8 (14.4-15.1) mm; interorbital breadth, 5.0 (4.7-5.2) mm; breadth across upper molars, 10.6 (10.5-11.0) mm; length of maxillary toothrow, 5.0 (4.8-5.3) mm. These measurements generally agree with those given by Paradiso (1967:600) for 20 individuals from Panamá. Females in our series average slightly larger than do males in external and cranial measurements. Six males weighed an average of 22.9 (20.7-25.1) gms; one nonpregnant female weighed 17.1 gms.

Diphylla ecaudata Spix, 1823

Specimens.—Boaco: Los Cocos, 14 km S Boaco, 220 m, 5. *Madriz:* 5 km N, 9 km E Condega, 800 m, 1. *Matagalpa:* 2 km N, 6 km E Esquipulas, 960 m, 1.

Our specimens constitute the first report of this species from Nicaragua. We follow Burt and Stirton (1961:37) in regarding *D. ecaudata* as monotypic.

Specimens from Los Cocos (three males and two females) were captured in a mist net stretched across a large, quiet pool in a small stream. The banks supported well-developed gallery forest, the understory of which had been cleared for human habitation; grassland (grazed) and small stands of secondary forest obtained beyond the riparian habitat. Domestic ducks, a possible source of food, were observed sleeping along the bank of this stream and on top of large boulders situated in the stream. Males from this locality taken on 20 February, 4 April, and 18 July had testicular lengths of 5, 6, and 6.5 mm, respectively. Two adult females collected there on 4 April were reproductively inactive. An adult male (testes 6 mm) from near Condega was captured on 23 June in a daytime roost in a small, cave-like crevice (see account of *Peropteryx marcotis*), and one from northeast of Esquipulas (testes 5 mm) was netted on 14 March along a forest trail (see account of *Vampyressa pusilla*).

Natalus stramineus saturatus Dalquest and Hall, 1949

Specimens.—Granada: 6 km S Nandaime, 5. *Zelaya:* S side Río Mico, El Recreo, 25 m, 2.

This funnel-eared species occupies an extensive geographic range (northern México to Brazil) but appears to be relatively rare in Middle America to the south of Guatemala. Our specimens represent the first of this species to be reported from Nicaragua.

Both specimens from El Recreo, adult males, were caught by hand at night after they flew through an open door into a small

room, possibly seeking insects that were swarming around a light bulb. Those from near Nandaime (three males, two females) were caught in a mist net set over the mouth of a well in which they were roosting; the well was approximately 2 m in diameter, and the water level was about 5 m below the rim. The females were not reproductively active (6 August).

We have compared our Nicaraguan material with a number of Mexicans specimens, including the holotype of *N. s. saturatus* and topotypes of *N. s. mexicanus*. We concur with Goodwin (1959) that in México there are two rather distinct subspecies, between which a broad zone of intergradation obtains. Our Nicaraguan specimens agree most closely with *N. s. saturatus*, and, until additional comparative material is available from Middle America, we tentatively refer them to that race. Handley (1966b:770) and Starrett and Casebeer (1968:15), however, regarded *mexicanus* as the appropriate name for specimens from Panamá and Costa Rica.

Selected measurements of two males from El Recreo are: length of forearm, 41.2, 39.0 mm; greatest length of skull, 17.1, 16.5 mm; zygomatic breadth, 8.4, 8.5 mm; mastoid breadth, 7.7, 7.6 mm; breadth of braincase, 8.2, 8.1 mm; interorbital constriction, 3.2, 3.2 mm; length of maxillary toothrow, 7.3, 7.1 mm.

Myotis albescens (É. Geoffroy St.-Hilaire, 1806)

This handsome *Myotis* has been reported previously from Nicaragua only from the Caribbean lowlands—from the Escondido and Prinzapolka rivers (Miller and Allen, 1928:203). We netted two specimens, both males, at Santa Rosa, 17 km N and 15 km E Boaco, 300 m, Boaco, in central Nicaragua on 13 July and 9 August 1967, under the same conditions described in the account of *Myotis elegans*. Testes of our specimens were 7 and 6 mm, respectively, in length. External and cranial measurements are as follows: total length, 84, 83 mm; length of tail, 31, 33 mm; length of hind foot, 9, 9 mm; length of ear, 15, 15 mm; length of forearm, 32.9, 35.1 mm; weight, 6.4, 6.2 gms; greatest length of skull, 13.9, 14.4 mm; zygomatic breadth, 8.9, 9.0 mm; postorbital breadth, 3.8, 3.9 mm; breadth of braincase, 7.2, 7.3 mm; mastoid breadth, 7.4, 7.6 mm; breadth across upper molars, 5.6, 5.5 mm; length of maxillary toothrow, 5.3, 5.3 mm.

Myotis elegans Hall, 1962

The first specimen on record of this rare *Myotis* from Central America, a nonpregnant female, was taken on 11 July 1967 at Santa Rosa, 17 km N and 15 km E Boaco, 300 m, Boaco. It was

captured in a mist net as it foraged over a small stream that supported relatively well-developed gallery forest along the bank. The surrounding area was grassland (grazed), with small patches of tropical forest located on the sides of hills. Twenty other species of bats were taken at this same locality including *Myotis argentatus* and *Myotis nigricans nigricans.*

External and cranial measurements of our specimen, followed in parentheses by those of the female holotype from Veracruz, are: total length, 71 (79) mm; length of tail, 32 (34) mm; length of hind foot, 7 (7.5) mm; length of ear, 11 (12) mm; length of forearm, 32.9 (33.0) mm; greatest length of skull, 12.5 (12.4) mm; condylobasal length, 11.6 (11.9) mm; zygomatic breadth, 8.2 mm; breadth of braincase, 5.8 (6.1) mm; postorbital breadth, 3.2 (3.2) mm; length of maxillary toothrow, 4.7 (4.6) mm. Our female weighed 3.2 gms.

Myotis nigricans nigricans (Schinz, 1821)

. *Specimens.—Boaco:* Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 2. *Chinandega:* 6.5 km N, 1 km E Cosigüina, 10 m, 1; San Antonio, 35 m, 1. *Chontales:* 1 km N, 2.5 km W Villa Somoza, 330 m, 1. *Madriz:* Darailí, 5 km N, 14 km E Condega, 940 m, 1. *Nueva Segovia:* 4.5 km N, 2 km E Jalapa, 680 m, 1. *Rivas:* 1 km NW Sapoá, 40 m, 1.

This small Neotropical *Myotis* has been reported from Nicaragua only from the Caribbean lowlands of Zelaya (Davis *et al.*, 1964: 379). Our records indicate that it is widely distributed in the republic but evidently nowhere common. Females taken on 5 March and 6 August each carried a single embryo (7 and 13 mm in crown-rump length, respectively), whereas one obtained on 21 July evidenced no reproductive activity. Richard K. LaVal currently is studying the *Myotis nigricans* complex; pending his revision our specimens are tentatively assigned to *M. n. nigricans.*

Myotis simus riparius Handley, 1960

A male (USNM 52800) from the Escondido River above Bluefields, originally reported by Miller and Allen (1928:203) as one of two *M. albescens* from that locality, provides the first record of the species from Nicaragua and the northernmost from Middle America. The cranial dimensions of this specimen, which compare well with those listed by Handley (1960:467) for the Panamanian holotype and paratype, are: greatest length of skull, 13.8 mm; zygomatic breadth, 8.9 mm; postorbital constriction, 3.5 mm; breadth of braincase, 6.7 mm; mastoid breadth, 7.4 mm; breadth across upper molars, 5.5 mm; length of maxillary toothrow, 5.2 mm.

From Nicaraguan specimens of *albescens,* the skull of the specimen of *simus* examined (skin not seen) differs most conspicuously in having a less inflated braincase, narrower postorbital region, and a distinct sagittal crest.

Eptesicus furinalis gaumeri (J. A. Allen, 1897)

Specimens.—Carazo: 3 km N, 4 km W Diriamba, 600 m, 7. *Chinandega:* Potosí, 5 m, 1; 6.5 km N, 1 km E Cosigüina, 10 m, 1; San Antonio, 35 m, 1. *Chontales:* 1 km N, 2.5 km W Villa Somoza, 330 m, 1; Hato Grande, 13 km S, 8 km W Juigalpa, 60 m, 3.

Davis (1965:234) reported two specimens of this species from Nicaragua, one from Carazo (listed above) and the other from 1 mi SE Yalagüina, 2600 ft, Madriz. The only other specimen on record from Nicaragua is from Greytown (Miller, 1897:100). Except for two individuals that were shot as they foraged in early evening, our specimens were captured in mist nets stretched over water or as described below.

Some of the bats captured northwest of Diriamba were taken in a net placed across the center of a water-filled, concrete cistern that was located in a large, open space used for drying coffee beans. Open at the top, the cistern was approximately 12 m in diameter, and the water level was approximately 3 m below the rim. Several *Artibeus jamaicensis, A. lituratus,* and *Molossus pretiosus* were caught in the same net. Aside from bats removed from the net, a few *Eptesicus* and *Molossus* were retrieved from the water where they fell, apparently stunned, after colliding with the wall of the cistern. The fact that a number of decomposed bats of these two species were observed floating in the water indicated that such entrapment was not caused by the placement of our net.

A female pregnant with two embryos (crown-rump length 15 mm) was captured on 22 April, whereas one taken on 5 July was lactating. Adult males taken in March (two) and April (two) had testes 5, 7, 9, and 10 mm long, respectively.

Rhogeessa tumida tumida H. Allen, 1866

Specimens.—Boaco: Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 2. *Carazo:* 3 km N, 4 km W Diriamba, 600 m, 2. *Chinandega:* 6 km N, 1 km E Cosigüina, 10 m, 3; Hda. Bellavista, 720 m, Volcán Casita, 1. *Matagalpa:* 1 km NE Esquipulas, 420 m, 1.

This small vespertilionid occurs throughout much of Central America, but the available material still is insufficient to permit an accurate assessment of geographic variation in that region. All but one of our specimens were trapped in mist nets. Those captured

near Diriamba were taken in a net stretched across a trail bordered by high cut-banks, whereas those from other localities were netted over small streams. The one bat from Bellavista was shot as it foraged in the evening along trees bordering the hacienda yard.

Two females taken on 5 March each had swollen uteri and may have been in an early stage of pregnancy. Others taken on 13 July, 9 August, and 15 August were reproductively inactive. Males had testes that measured 2.5 (March), 3 (July), and 2 (August) mm.

We have compared our material with representative specimens from México of *R. parvula* and *R. tumida*, as defined by Goodwin (1958); we are not wholly convinced that these are valid species (rather than variable geographic races of the same species). Certainly there is need for additional investigation of the problem. Our Nicaraguan specimens most closely resemble *R. t. tumida* (see Goodwin, *op. cit.*:3), to which they are tentatively referred.

Selected measurements of two females from Boaco and a male from Matagalpa, followed by the average (and extremes) of three males and three females from western Nicaragua (Carazo and Chinandega), are, respectively: length of forearm, 30.4, 28.5, 28.3, 28.2 (27.5-29.0) mm; greatest length of skull, 12.8, 12.7, 12.8, 12.1 (11.8-12.5) mm; zygomatic breadth, 8.1, 8.4, 8.6, 8.1 (7.8-8.6) mm; mastoid breadth, 7.1, 7.2, 7.2, 6.8 (6.6-7.1) mm; breadth of braincase, 6.0, 5.7, 6.0, 5.6 (5.3-6.1) mm; postorbital constriction, 3.3, 3.0, 3.3, 3.0 (2.9-3.2) mm; length of maxillary toothrow, 4.7, 4.7, 4.5, 4.3 (4.2-4.6) mm; weight, 4.4, 4.3, 3.8, 3.5 (3.1-3.9) gms.

Tadarida laticaudata yucatanica (Miller, 1902)

One adult male (testes 5 mm) of this free-tailed bat from Potosí, 5 m, Chinandega, on the Cosigüina Peninsula, provides the only record of the genus *Tadarida* from Nicaragua. This specimen was netted after dark over a small stream that flowed into the Bay of Fonseca approximately 200 yards below our nets (see account of *Noctilio leporinus*). Other species taken in the same net included *Carollia subrufa, Sturnira lilium, Eptesicus furinalis, Molossus ater,* and *Molossus molossus.*

Selected measurements of the male are: total length, 92 mm; length of tail, 31 mm; length of hind foot, 10 mm; length of ear, 15 mm; length of forearm, 39.2 mm; weight, 10.3 gms; greatest length of skull, 17.2 mm; zygomatic breadth, 10.6 mm; postorbital constriction, 4.0 mm; breadth of braincase, 8.6 mm; length of maxillary toothrow, 6.5 mm.

Eumops auripendulus (Shaw, 1800)

A broken skull (USNM 339917) of a female of this species from Hda. Mecatepe [2 km N, 11.5 km E Nandaime, *ca.* 40 m], Granada, represents the only known specimen of the genus *Eumops* from Nicaragua. This bat was obtained by M. K. Clark on 25 August 1964, but the conditions under which it was captured are not known. Available cranial measurements are: zygomatic breadth, 12.6 mm; breadth of braincase, 10.7 mm; postorbital breadth, 4.3 mm; rostral breadth, 7.4 mm; length of maxillary toothrow, 9.1 mm; length of mandibular c-m3, 10.0 mm.

Molossus ater nigricans Miller, 1902

Specimens.—Chinandega: Potosí, 5 m, 21; 4.5 km N Cosigüina, 15 m, 2; El Paraíso, 1 km N Cosigüina, 20 m, 17; Hda. Bellavista, 720 m, Volcán Casita, 4; Hda. San Isidro, 10 km S Chinandega, 20 m, 2; San Antonio, 35 m, 2. *Nueva Segovia:* Corozo, 15 km NNE Jalapa, 660 m, 1; 3.5 km S, 2 km W Jalapa, 660 m, 4.

Only one specimen of this large molossid (from Volcán de Chinandega—J. A. Allen, 1908:670) has been reported from Nicaragua. All of our specimens are from the northern or northwestern part of the country. Many were shot in early evening as they followed a straight, direct flight pattern (presumably from day-roosts toward foraging or watering areas); the series from Potosí was netted over a small stream as described in the account of *Noctilio leporinus*. We confidently refer our material to the species currently known as *ater*, although assignment to the subspecies *nigricans* is tentative.

Of 21 females autopsied in the first week of March on the Cosigüina Peninsula, seven were pregnant, each with a single embryo (7-22 mm in crown-rump length, average 16.7). Ten males taken at the same time had an average testicular length of 5.7 (2-7) mm, whereas the testes of a male obtained on 9 March at San Antonio measured 8 mm. None of five females obtained in late July in Nueva Segovia evidenced reproductive activity, nor did two of three females taken in July and one taken in August from Chinandega; the fourth Chinandegan female, taken on 17 July, carried an embryo that was 36 mm in length. Two males from southern Chinandega (mid-July) had testes 7 and 4 mm long.

Representative measurements of 10 specimens of each sex from Nicaragua are given in table 4.

Molossus molossus aztecus Saussure, 1860

Specimens.—Chinandega: Potosí, 5 m, 1; Hda. San Isidro, 10 km S Chinandega, 20 m, 1 (USNM). *Boaco:* Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 7. *Managua:* 3 mi SW Managua, 8. *Rivas:* Rivas, 60 m, 4.

This small free-tailed species has been reported from Nicaragua by Felten (1957:14), who listed two females from Corinto. Our records indicate that it is widely distributed, but of localized occurrence. Specimens from Potosí and Santa Rosa were captured in mist nets over streams (as described in the accounts of *Noctilio leporinus* and *Myotis elegans,* respectively). The specimen from Hda. San Isidro was shot in flight, whereas those from Rivas were captured in a daytime retreat in a deep crevice in a concrete school building. We have no precise knowledge of the conditions under which bats from 3 mi SW Managua were obtained but suspect they were taken from a building.

Females in our series were reproductively active at all times for which we have information—early March through mid-July—as follows: a female from Potosí (6 March) carried an embryo that measured 5 mm (crown-rump length) as did one from Santa Rosa (21 March, 17 mm in length); two of three females taken 3 mi SW Managua on 28 March were pregnant (embryos 13 and 15 mm), whereas each of two collected there on 3 May were gravid (embryos 27 and 30 mm); one female from Rivas (25 June) carried an embryo (30 mm) and another was lactating and accompanied by a small (forearm, 19.7 mm) hairless juvenile; and, finally, one of six females netted at Santa Rosa on 13 July was pregnant (embryo 23 mm), but the others evinced no reproductive activity. An adult male, taken at Rivas with the females mentioned above, had testes that were 6 mm in length.

Bats of the genus *Molossus* are in need of thorough systematic study. We think most, if not all, mainland populations of small *Molossus* with pale-based hairs pertain to the species *Molossus molossus,* originally described from the Lesser Antilles. Although there is some variation in size and overall color among our Nicaraguan samples, all seem to represent that species. Because specimens from Nicaragua closely resemble examples of *M. m. aztecus* from Jalisco, México (Table 3), in external and cranial proportions, we tentatively refer them to *aztecus.*

In our field experience in both Middle and South America, colonies of *M. molossus* tend to be extremely localized, with individual populations or demes frequently separated by many miles of territory in which the species seemingly does not regularly occur.

Table 3.—Selected measurements of adult *Molossus molossus*.

Number of specimens averaged or catalogue number, and sex	Length of forearm	Greatest length of skull	Condylobasal length	Zygomatic breadth	Mastoid breadth	Breadth of braincase	Postorbital constriction	Length of maxillary toothrow	Breadth across upper molars
Western Jalisco, México									
KU 109075, ♂	38.2	18.0	15.3	11.0	10.5	9.1	3.8	6.2	7.9
KU 109076, ♂	37.3	17.8	15.3	11.0	10.5	9.2	3.6	6.3	8.1
KU 120540, ♂	37.7	17.8	15.3	11.0	10.8	8.9	3.9	6.3	8.1
Average 15 (♀)	37.1	17.2	14.8	10.7	10.3	8.9	3.8	6.1	7.9
Minimum	36.0	16.5	14.2	10.4	10.1	8.5	3.7	6.0	7.7
Maximum	38.1	17.7	15.2	11.0	10.5	9.2	3.9	6.2	8.2
Departamento de Chinandega, Nicaragua									
USNM 337552, ♂	39.0±	18.2	15.5	11.0	10.7	9.0	3.7	6.0	8.0
KU 114140, ♀	37.3	16.8	14.7	10.7	9.9	8.7	3.4	5.9	7.4
3 mi SW Managua, Nicaragua									
KU 71009, ♂	39.8	18.7	16.1	11.1	10.9	8.9	3.8	6.3	8.0
KU 71011, ♂	39.4	18.5	16.5	—	11.0	9.2	3.7	6.7	8.0
Average 5 (♀)	38.9	17.5	15.4	10.7	10.3	9.0	3.6	6.1	7.8
Minimum	38.1	17.2	15.1	10.5	10.1	8.9	3.5	5.9	7.6
Maximum	39.7	18.0	15.9	10.9	10.6	9.1	3.7	6.3	8.0
Santa Rosa, Boaco, Nicaragua									
Average 6 (♀)	36.0	17.5	14.7	10.8	10.6	9.1	3.7	6.0	8.0
Minimum	35.5	17.3	14.4	10.6	10.4	9.0	3.6	5.7	7.8
Maximum	36.7	17.8	15.1	11.0	10.8	9.2	3.8	6.2	8.2
Rivas, Nicaragua									
KU 106291, ♂	38.2	18.8	16.1	11.5	10.9	9.4	3.8	6.6	8.3
KU 106290, ♀	39.6	17.4	15.0	11.0	10.5	9.1	3.6	6.0	7.7
KU 106293, ♀	37.2	17.3	14.8	10.7	10.2	9.0	3.5	5.7	7.8

The localized and presumably highly inbred populations may have diverged morphologically, in some cases at least, to a degree that mensural differences can be demonstrated even between samples from the same general geographic area. Localized variation and relatively marked secondary sexual variation (unrecognized by some earlier workers), superimposed on geographic variation, have resulted in application of a relatively large number of names to these small *Molossus*. Felten (1957:13-14), for example, apparently used different specific names for males and females from El Salvador, and Gardner (1966) employed three different specific names for North American specimens. Only when material is available for a detailed study of variation throughout the Neotropics can the perplexing mosaic of characters in these small *Molossus* be assessed adequately.

We have seen no specimens from Nicaragua that are identifiable as *Molossus bondae,* another relatively small species that has been reported from Greytown (Miller, 1913a:89) and from elsewhere in Central America by other authors (Goodwin, 1942c:145; Handley, 1966b:772; Gardner *et al.,* 1970:727). Our examination of the female holotype of *M. bondae* reveals that it is larger than *M. molossus,* corresponding in size to females recently reported from Costa Rica by Gardner *et al. (loc. cit.),* and that *bondae* has dark-based hairs. The two males reported by Goodwin *(loc. cit.)* from Honduras as *bondae,* would seem to be too small for that species, based on the measurements listed; also, these specimens allegedly have white-based hairs and probably represent *M. molossus* as here defined.

Molossus pretiosus pretiosus Miller, 1902

Specimens.—Boaco: Los Cocos, 14 km S Boaco, 220 m, 28; San Francisco, 19 km S, 2 km E Boaco, 200 m, 3. *Carazo:* 3 km N, 4 km W Diriamba, 600 m, 25. *Managua:* 6 mi WSW Managua, 3.

This relatively large mastiff bat has not been reported previously from Nicaragua. Specimens from several localities in Boaco were captured in mist nets over streams; most of those from northwest of Diriamba were shot in the early evening as they foraged high around large trees in a coffee finca, but several were netted over a water-filled concrete tank or found in the water in the tank as detailed in the account of *Eptesicus furinalis.* At Los Cocos, bats that we netted seemed to be emerging from a hollow located high in a tree over the stream.

Selected measurements of *M. p. pretiosus* from Nicaragua, which compare favorably with those of topotypes from Venezuela, are listed in table 4 along with measurements of *M. ater* and *M. sinaloae.* The taxonomic relationships of *M. pretiosus* and *M. ater* are less than clear, and some authors (Handley, 1966b:773, for instance) have suggested that the two may be conspecific. Whatever their ultimate relationships may prove to be, two distinctive taxa seem to be present in Nicaragua; the larger is assignable to *ater* and the smaller to *pretiosus,* as currently understood. Furthermore, the presumed presence of two large *Molossus* with dark-based hairs elsewhere in Central America (Dilford C. Carter, personal communication) and in southeastern México (Goodwin, 1956:4; Goodwin and Greenhall, 1964:20) argues for specific recognition of *pretiosus.*

The species *ater* and *pretiosus* differ mainly in size (Table 4), some measurements clearly separating the two when sexual dimor-

TABLE 4.—Selected measurements of adults of three species of *Molossus* from Nicaragua.

Number of specimens averaged or catalogue number, and sex	Length of forearm	Greatest length of skull	Condylobasal length	Zygomatic breadth	Breadth of braincase	Length of maxillary toothrow	Breadth across upper canines
Molossus ater nigricans, Departamento de Chinandega, Nicaragua							
Average 10 (♂)	49.5	23.2	20.2	14.3	11.0	8.2	6.1
Minimum	48.2	22.8	19.9	14.1	10.5	8.0	6.0
Maximum	50.7	23.5	20.5	14.9	11.2	8.3	6.3
Average 10 (♀)	49.0	22.0	19.2	13.6	10.7	7.8	5.8
Minimum	47.1	21.5	18.8	13.3	10.5	7.6	5.6
Maximum	51.2	22.5	20.0	14.1	11.0	8.2	6.1
Molossus pretiosus pretiosus, Departamento de Boaco, Nicaragua							
Average 8 (♂)	45.1	21.7	18.8	13.4	10.6	7.6	5.9
Minimum	44.1	21.0	18.3	13.1	10.2	7.4	5.6
Maximum	46.1	22.2	19.1	13.7	10.9	7.9	6.1
Average 23 (♀)	43.6	20.2	17.7	12.5	10.1	7.3	5.2
Minimum	41.0	19.5	17.2	12.2	9.5	7.1	5.0
Maximum	44.8	20.7	18.2	13.1	10.4	7.6	5.6
6 mi SW Managua, Nicaragua							
KU 70135, ♂	44.8	21.7	18.6	13.0	10.2	7.7	5.8
KU 70137, ♂	45.1	21.6	19.0	13.2	10.7	7.7	5.8
KU 70136, ♀	43.5	19.9	17.8	12.7	10.3	7.5	5.5
3 km N, 4 km W Diriamba, Nicaragua							
Average 7 (♂)	44.8	21.2	18.5	13.0	10.5	7.4	5.5
Minimum	43.8	20.7	18.3	12.7	10.2	7.2	5.4
Maximum	45.7	21.3	18.8	13.3	10.9	7.6	5.5
Average 9 (♀)	44.0	20.7	18.0	12.6	10.2	7.3	5.3
Minimum	42.0	20.0	17.4	12.0	10.0	7.0	5.0
Maximum	45.5	21.2	18.6	13.0	10.6	7.5	5.5
Molossus sinaloae sinaloae, El Recreo, Nicaragua							
Average 4 (♂)	47.6	21.2	18.6	12.3	9.8	7.7	5.4
Minimum	46.7	20.7	18.3	12.0	9.7	7.6	5.3
Maximum	48.6	21.5	18.9	12.6	10.0	7.9	5.5
Average 10 (♀)	47.5	20.2	17.8	11.8	9.7	7.3	5.1
Minimum	46.2	20.0	17.6	11.5	9.5	7.1	5.0
Maximum	48.3	20.4	18.0	12.0	9.8	7.5	5.5

phism is considered. Also, the average weights of 18 nonpregnant females and four males of *pretiosus* (all adults) collected on 20 February 1968 at Los Cocos, were 20.9 (14.6-23.8) and 27.0 (24.6-31.7) gms, respectively, significantly smaller than corresponding figures for 11 nonpregnant females and nine males of *M. a. nigricans* taken two weeks later on the Cosigüina Peninsula—29.1

(26.1-33.0) and 32.9 (29.3-35.1) gms. It is of note that we have not collected these two large species at the same localities in Nicaragua, and it is possible that one competitively excludes the other in local situations.

Among females from Departamento de Boaco, none of 18 collected on 20 February was pregnant, whereas three of four obtained on 4 April were gravid (embryos 13, 15, and 17 mm in crown-rump length) as was one (embryo 21 mm) taken on 18 July. Among those from northwest of Diriamba, two of three were pregnant on 30-31 March (embryos 7 and 13 mm in length), whereas only three of eight carried embryos (29, 31, and 34 mm) in mid-August at a time when flying young also were collected. Additionally, a female captured 6 mi WSW Managua on 27 March had an embryo that measured 11 mm.

Four adult males collected on 20 February had an average testicular length of 5.7 (4-7) mm, whereas those of seven obtained in late March averaged 5.0 (4-6) mm; testes of two adults taken on 18 July were 6 and 6.5 mm, and those of three taken in the period 12-15 August were 5 mm in length.

Molossus sinaloae sinaloae J. A. Allen, 1906

Specimens.—Boaco: Santa Rosa, 17 km N, 15 km E Boaco, 300 m, 1. *Managua:* 1 km N Sabana Grande, 1; 3 mi SW Managua, 1; 8 km SW Managua, 400 m, 3. *Rivas:* San Juan del Sur, 20 m, 1. *Zelaya:* S side Río Mico, El Recreo, 25 m, 73.

This mastiff bat can be distinguished easily from the other two large species of *Molossus* in Nicaragua in that the hairs of the dorsum are relatively long and are pale, frequently white, basally. The species has been reported twice previously from Nicaragua—from Greytown by Miller (1913a:89) and by Goodwin and Greenhall (1964:13), who listed four individuals from Río Grande.

Most of our specimens were taken from buildings. A large series obtained in a house at El Recreo in late June 1966 consisted only of females and young, many of which were nearly full grown; some females still were lactating and at least two were pregnant (on 23 June—crown-rump length of embryos 12 and 14 mm). A group taken from another house at El Recreo (from cracks in the stone wall and from between rafters and the corrugated metal roof) in late July 1966 consisted of adult males, lactating females, and young. Similarly, an adult male, a pregnant female (embryo 14 mm in crown-rump length), and a hairless juvenile were shot, on 16 February 1964, from a small colony in an attic of a large house

southwest of Managua; *Glossophaga soricina* also was taken in this attic. The testes of an adult male captured in June were 6 mm in length; those of four taken in July were 5, 5, 6, and 7 mm, and one obtained in August had testes that measured 3 mm.

Selected measurements of *M. s. sinaloae* from El Recreo are given in table 4.

CHECKLIST OF NICARAGUAN BATS

Following is a checklist of the 68 species of bats thus far reported from Nicaragua. Citations are given only to publications that are primary sources of information on Nicaraguan specimens. In some instances, specimens were reported in the literature under a name different than the one here employed; we have mentioned earlier-used names where it seemed appropriate to do so. Taxa preceded by an asterisk are included in the present paper.

Family EMBALLONURIDAE

Rhynchonycteris naso (Wied-Neuwied, 1820).—J. A. Allen (1908:669, 1910: 110), Sanborn (1937:327), Davis *et al.* (1964:375, 379).

Saccopteryx bilineata (Temminck, 1838-1839).—J. A. Allen (1910:110), Sanborn (1937:331), Jones (1964a:506).

**Saccopteryx leptura* (Schreber, 1774).—Davis *et al.* (1964:374), Jones (1964a:506).

Cormura brevirostris (Wagner, 1843).—J. A. Allen (1910:110—specimens listed as *Peropteryx canina* from Peña Blanca, see Sanborn, 1937:348), Miller (1924:38), Sanborn (1937:349), Goodwin (1942c:119).

Peropteryx kappleri kappleri Peters, 1867.—J. A. Allen (1908:669, 1910:110 —as *P. canina*), Sanborn (1937:344).

**Peropteryx macrotis macrotis* (Wagner, 1843).

Balantiopteryx plicata plicata Peters, 1867.—Jones *et al.* (1962:152), Davis *et al.* (1964:375), Jones (1964a:506).

Diclidurus virgo Thomas, 1903.—Alston (1879-82:30).

Family NOCTILIONIDAE

**Noctilio labialis labialis* (Kerr, 1792).—Goodwin (1942c:121, 1946:297), Davis *et al.* (1964:376), Kohls *et al.* (1965:344), Wenzel *et al.* (1966: 578).

**Noctilio leporinus mexicanus* Goldman, 1915.—Davis *et al.* (1964:376).

Family PHYLLOSTOMATIDAE

**Pteronotus davyi fulvus* (Thomas, 1892).

**Pteronotus parnellii fuscus* J. A. Allen, 1911.—Miller (1902:402), Rehn (1904:203).

**Pteronotus suapurensis* (J. A. Allen, 1904).—Goodwin (1942a:88, 1946:299, 1953:246).

Micronycteris brachyotis (Dobson, 1879).—Goodwin (1946:302—as *M. sylvestris*), Sanborn (1949:224—as *M. platyceps*), Goodwin and Greenhall (1961:231).

Micronycteris hirsuta (Peters, 1869).—Valdez and LaVal (1971:247).

**Micronycteris megalotis mexicana* Miller, 1898.—G. M. Allen (1929:130).

**Micronycteris megalotis microtis* Miller, 1898.—Miller (1898:328, 1900:154), Lyon and Osgood (1909:263), J. A. Allen (1910:110), Poole and Schantz (1942:133).

Micronycteris minuta (Gervais, 1856).—Valdez and LaVal (1971:248).

Micronycteris schmidtorum Sanborn, 1935.—Davis *et al.* (1964:378).

Macrophyllum macrophyllum (Schinz, 1821).—Davis *et al.* (1964:378), Jones (1964a:506).

**Tonatia nicaraguae* Goodwin, 1942.—Goodwin (1942b:205, 1946:305, 1953: 246), Davis and Carter (1962:67), Valdez and LaVal (1971:248).

Phyllostomus discolor verrucosus Elliot, 1905.—Jones (1964a:507), Wenzel *et al.* (1966:598).

**Phyllostomus hastatus panamensis* J. A. Allen, 1904.—Goodwin (1942c:126), Wenzel *et al.* (1966:597).

**Trachops cirrhosus coffini* Goldman, 1925.—Carter *et al.* (1966:491).

**Chrotopterus auritus auritus* (Peters, 1856).

Vampyrum spectrum nelsoni (Goldman, 1917).—Gray (1844:18), Dobson (1878:471), Alston (1879-82:39), J. A. Allen (1910:111), Goldman (1917:116), Goodwin (1946:310).

Glossophaga commissarisi Gardner, 1962.—Davis *et al.* (1964:380), Jones (1964a:507).

Glossophaga soricina leachii (Gray, 1844).—Gray (1844:18), Dobson (1878: 501), Alston (1879-82:44), J. A. Allen (1910:111), Miller (1913b:419), Alvarez (1963:400), Davis *et al.* (1964:380), Starrett and de la Torre (1964:57).

**Anoura geoffroyi lasiopyga* (Peters, 1868).

**Choeroniscus godmani* (Thomas, 1903).—Handley (1966a:86).

**Lichonycteris obscura* Thomas, 1895.—Thomas (1895:57), Davis *et al.* (1964:380).

**Carollia castanea* H. Allen, 1890.—Davis *et al.* (1964:379).

Carollia perspicillata azteca Saussure, 1860.—Hahn (1907:112), J. A. Allen (1908:669, 1910:111), Davis *et al.* (1964:379), Starrett and de la Torre (1964:58).

Carollia subrufa (Hahn, 1905).—Davis and Carter (1962:71), Davis *et al.* (1964:379).

Sturnira lilium parvidens Goldman, 1917.—Davis *et al.* (1964:379), Starrett and de la Torre (1964:59), Jones (1964a:507).

**Sturnira ludovici ludovici* Anthony, 1924.

Uroderma bilobatum convexum Lyon, 1902.—Davis *et al.* (1964:382), Jones (1964a:507), Davis (1968:695).

Uroderma bilobatum molaris Davis, 1968.—Davis *et al.* (1964:382), Davis (1968:697).

**Uroderma magnirostrum* Davis, 1968.—Davis (1968:680).

**Vampyrops helleri* Peters, 1866.—Davis *et al.* (1964:383), Jones (1964a:507), Valdez and LaVal (1971:248).

**Vampyrodes major* G. M. Allen, 1908.—J. A. Allen (1910:112), Goodwin (1946:320).

**Vampyressa nymphaea* Thomas, 1909.

**Vampyressa pusilla thyone* Thomas, 1909.—Starrett and de la Torre (1964: 60).

**Chiroderma villosum jesupi* J. A. Allen, 1900.

Ectophylla alba H. Allen, 1892.—H. Allen (1892:441, 1898:267), Lyon and

Osgood (1909:266), Poole and Schantz (1942:129), Goodwin (1942c: 134, 1946:323), Goodwin and Greenhall (1962:4). Type locality (Río Segovia) placed in Comarca de El Cabo, Nicaragua, by Miller and Kellogg (1955:77).

Artibeus inopinatus Davis and Carter, 1964.—Davis and Carter (1964:120).

Artibeus jamaicensis paulus Davis, 1970.—Andersen (1908:266), Davis (1970b:121).

Artibeus jamaicensis richardsoni J. A. Allen, 1908.—Andersen (1908:267), J. A. Allen (1908:669), Elliot (1917:168), Goodwin (1953:249), Davis and Carter (1964:120), Davis *et al.* (1964:379), Starrett and de la Torre (1964:60), Davis (1970b:116).

Artibeus lituratus palmarum J. A. Allen and Chapman, 1897.—Andersen (1908:279), Davis and Carter (1964:120), Davis *et al.* (1964:379), Starrett and de la Torre (1964:61).

Artibeus phaeotis palatinus Davis, 1970.—Davis (1970a:401).

Artibeus phaeotis phaeotis (Miller, 1902).—Davis *et al.* (1964:379), Davis (1970a:399).

**Artibeus toltecus hesperus* Davis, 1969.

**Artibeus toltecus toltecus* (Saussure, 1860).—Andersen (1908:300), Davis (1969:28).

**Artibeus watsoni* Thomas, 1901.—Andersen (1908:290), Davis and Carter (1962:71), Davis (1970a:393).

**Centurio senex senex* Gray, 1842.—Goodwin (1946:327, restricted type locality to El Realejo, Nicaragua).

Desmodus rotundus murinus Wagner, 1840.—J. A. Allen (1908:670, 1910: 113).

**Diphylla ecaudata* Spix, 1823.

Family NATALIDAE

**Natalus stramineus saturatus* Dalquest and Hall, 1949.

Family THYROPTERIDAE

Thyroptera discifera discifera (Lichtenstein and Peters, 1854).—Miller 1896: 111, 1931:411), Goodwin (1946:330).

Family VESPERTILIONIDAE

**Myotis albescens* (É. Geoffroy St.-Hilaire, 1806).—Miller and G. M. Allen (1928:203).

**Myotis elegans* Hall, 1962.

**Myotis nigricans nigricans* (Schinz, 1821).—Davis *et al.* (1964:379), McDaniel and Coffman (1970:223).

**Myotis simus riparius* Handley, 1960.

**Eptesicus furinalis gaumeri* (J. A. Allen, 1897).—Miller (1897:100), Davis (1965:234).

Lasiurus borealis frantzii (Peters, 1871).—Davis and Carter (1962:73).

**Rhogeessa tumida tumida* H. Allen, 1866.—J. A. Allen (1910:113), Goodwin (1958:3).

Family MOLOSSIDAE

**Tadarida laticaudata yucatanica* (Miller, 1902).

**Eumops auripendulus* (Shaw, 1800).

**Molossus ater nigricans* Miller, 1902.—J. A. Allen (1908:670).
Molossus bondae J. A. Allen, 1904.—Miller (1913a:89).
**Molossus molossus aztecus* Saussure, 1860.—Felten (1957:14).
**Molossus pretiosus pretiosus* Miller, 1902.
**Molossus sinaloae sinaloae* J. A. Allen, 1906.—Miller (1913a:89), Goodwin and Greenhall (1964:13).

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